Lowering Your Cholesterol

What a Harvard Doctor Wants You to Know!

MASON FREEMAN, M.D.
ASSOCIATE PROFESSOR, HARVARD MEDICAL SCHOOL
WITH
CHRISTINE JUNGE

EXPERT INFORMATION ON
✓ The latest guidelines and what they mean for you
✓ How low your LDL really should be
✓ Medications and other treatments
✓ What you can do without drugs
Lowering Your Cholesterol

What a Harvard Doctor Wants You to Know!

EXPERT INFORMATION ON

✓ The latest guidelines and what they mean for you
✓ How low your LDL really should be
✓ Medications and other treatments
✓ What you can do without drugs
Table of Contents

Title Page
Copyright Page
Professional
Dedication
Preface
  A Heart Attack at Twenty-Four?
  Three Hundred Is a Healthy Cholesterol Level?
  The Truth About Cholesterol
Acknowledgments

CHAPTER 1 - Understanding Cholesterol: The Good, the Bad, and the Necessary
  What Is Cholesterol?
  A Lipoprotein by Any Other Name
  You Mean My Body Makes Cholesterol?
  The Other Source: Diet
  Why You Need to Know

CHAPTER 2 - Heart Disease Primer
  What Is Heart Disease?
  How Heart Disease Happens
  What a Heart Attack Feels Like
  What to Do if You’re Having a Heart Attack
  A Heart Attack Plan

CHAPTER 3 - If You Know You Have Heart Disease
  Medications
  Procedures to Open Blocked Arteries
  Alternative Remedies
  Choose the Treatment That’s Right for You

CHAPTER 4 - Risk Factors for Heart Disease
  Unavoidable Risk Factors
CHAPTER 5 - When You Visit Your Doctor

Inaccuracies in the Tests
When to Treat Cholesterol
Step 1: Considering Your Cholesterol Levels
Step 2: Determining if You Have Heart Disease or Diabetes
Step 3: Measuring Your Risk Factors
Step 4: Calculating Your Heart Attack Risk
Step 5: Finding Your Treatment Category
Step 6: Determining Your Treatment
Personalizing the NCEP Guidelines

CHAPTER 6 - A Diet to Lower Your Cholesterol

Benefits of Adopting a Heart-Healthy Lifestyle
Your Cholesterol-Lowering Diet
What About Dietary Cholesterol?
Finding the Diet That’s Right for You

CHAPTER 7 - An Exercise Program to Lower Your Cholesterol

The Benefits and Risks of Exercise
A Program to Get You Started
How Much Should You Exercise?
Fitting Exercise into Your Life
Designing the Right Program
Sticking with Exercise

CHAPTER 8 - Drug Treatment

Reductase Inhibitors (Statins)
Other Drugs
How to Save Money on Drugs

CHAPTER 9 - Treating Other Lipid Problems

Elevated Triglycerides
A Problem in Two Parts: High LDL and High Triglycerides
Low HDL

CHAPTER 10 - Special Considerations for Seniors, Children, and People with Heart
Disease or Diabetes

If You’re a Senior
If Your Child Has High Cholesterol
If You Have Heart Disease
If You Have Diabetes

CHAPTER 11 - On the Horizon

Increasing HDL Levels
High-Tech Scans
Over-the-Counter Statins
Genetics, Lipids, and Heart Disease
Progress Takes Time

CHAPTER 12 - Alternative and Complementary Approaches to Lowering Cholesterol

Coenzyme Q10
Plant Sterols and Stanols
Policosanol Alcohol
Soy
Red Yeast Rice
Green Tea
Guggul
Chromium
Quercetin
Soy Lecithin
Garlic
Vitamins C and E
The Bottom Line

Afterword

Resources

General
Diabetes Issues
Smoking Cessation
Saving Money on Drugs
Nutrition

Notes
THE
HARVARD MEDICAL
SCHOOL GUIDE TO
LOWERING YOUR

CHOLESTEROL

MASON W. FREEMAN, M.D.
WITH CHRISTINE JUNGE

McGraw-Hill
New York Chicago San Francisco Lisbon London Madrid Mexico City
Milan New Delhi San Juan Seoul Singapore Sydney Toronto
Want to learn more?
We hope you enjoy this McGraw-Hill eBook! If you’d like more information about this book, its author, or related books and websites, please click here.
This book is dedicated to my mother, Marion Freeman, late father, Admiral Mason Freeman, and my wife, Sherry, for all their love, support, and encouragement.
-Mason

For my parents, Linda and Heinz Junge, who have been nothing but loving and supportive from the beginning, and for my husband, Brian, who has been nothing but loving and supportive from our beginning.
-Christine
What’s your cholesterol? It’s a question you hear everywhere, from family gatherings to television commercials. Though awareness of the dangers of high cholesterol has greatly increased in the past two decades, there are still many myths out there. The biggest myth, although it is gradually being dispelled, is that all cholesterol is created equal. In reality, as many people are beginning to understand, the cholesterol in our blood is carried in several different particles—the main ones being high-density lipoproteins (HDL) and low-density lipoproteins (LDL). These two types of particles have completely different effects on blood vessels and their likelihood of getting clogged. Put simply, HDL protects your body from heart disease, while LDL can cause it.

That’s why Peter and Mary, the patients whose stories are told in this preface, have totally different levels of risk for heart disease, despite having the same total cholesterol level. When you’re talking about cholesterol, what matters most isn’t your total cholesterol level—it’s the breakdown of how that cholesterol is carried. Even individuals with total cholesterol levels below 200—long considered a “safe zone”—can be at high risk for heart disease if they carry too little cholesterol in the HDL particles or have other risk factors that predispose them to the blocked arteries that cause heart attacks.

A Heart Attack at Twenty-Four?

Peter was twenty-four when he first began to experience a heavy pressure in his chest whenever he jogged, split wood, or bicycled up steep hills. He assumed he had pulled a muscle, though he couldn’t pinpoint the event that caused this “injury.” He tried to ignore the discomfort, but as the weeks went by, the pressure in his chest grew more intense whenever he exercised, and he started to get short of breath with less and less activity. He began to worry that he might have a more serious problem, like the heart disease that had hospitalized his father at forty-four. But Peter was sure that at age twenty-four that couldn’t be the explanation.

On a cool, brisk Saturday afternoon, while biking through the autumn foliage in a distant Boston suburb, Peter’s pain began again. This time, it did not subside after half an hour, as it had on all the previous occasions. Peter asked a friend on the bike trip to drive him to the local emergency room. Several hours later—after Peter’s cardiac catheterization, angioplasty, and stent placement were completed—he found himself wondering what having a heart attack at twenty-four would mean for his business career, his love of aerobic sports, and the young woman he was planning to marry in the spring.

When Peter asked the cardiac care nurse if she could explain how someone so fit and so young could have a heart attack, she said, “Your cholesterol level just came back—it was over 300. I think that explains why you’re here.”

Three Hundred Is a Healthy Cholesterol Level?

When Mary was sixty-five, her business set up an afternoon health-screening program in the
company cafeteria. She got screened during her lunch break and found out that her total cholesterol level was higher than 300. The screeners told her to contact her physician and get advice on treatment. Her family practitioner repeated the test and confirmed the level, asking Mary to try a low-fat, low-cholesterol diet to see if that would improve her numbers. She tried the diet the nutritionist prescribed, faithfully eating the foods on the plan, though she found the meals bland and unappealing.

When she went back to her doctor after two months, her cholesterol level had barely changed. Her doctor advised that she take a cholesterol-lowering pill called a statin. Mary was reluctant to follow this advice. She had never taken any medication before and didn’t like the idea of having to take a pill every day. In the back of her mind she heard the voices of several of her friends who were already on cholesterol-lowering pills and who were always complaining about their cost. A few of them even said the medicines had made them feel achy and weak. Mary asked her doctor if she could get a second opinion about the need for treatment.

During her appointment with a specialist, the doctor told her that though her total cholesterol level was above 300, she was not at very high risk for heart disease because her HDL (good) cholesterol was high, while her LDL (bad) cholesterol was low. He made a few simple recommendations about her diet—ones that she knew she could stick with—and encouraged her to get a little more exercise. He said he would write a note to her regular doctor explaining why Mary did not need to take a cholesterol medication.

The Truth About Cholesterol

Another myth about cholesterol is that the healthiest cholesterol level you can have is zero. If people didn’t have any cholesterol, they’d die—and so would the human species. Men wouldn’t produce testosterone without it, women wouldn’t produce estrogen, and without those, humans wouldn’t produce the next generation. Your intestines couldn’t digest food without cholesterol, and your cells couldn’t create their outside coating known as a plasma membrane. So, cholesterol itself isn’t bad. What is bad is having too much and carrying it in the wrong places, such as your artery walls.

Most of the cholesterol that travels in your blood is actually made by your liver—only a minority of it comes from cholesterol in the food you eat. Certain fats in your diet besides cholesterol—particularly saturated fats and trans fats—cause the liver to make unhealthy amounts of cholesterol. Indeed, the saturated fats and trans fats in your diet do more to raise your cholesterol than does the cholesterol in the food you eat.

Regardless of where it comes from, when there’s too much LDL in your blood, it gets deposited in the walls of your arteries, the blood vessels that carry oxygen-rich blood to your heart and brain. Through a series of steps we’ll discuss in Chapter 2, the accumulation of LDL causes a narrowing and instability in the artery walls, which ultimately can lead to heart attacks and strokes.

The good news is that, for most people, heart disease is preventable if you do heart-healthy things that lower your LDL cholesterol. Lifestyle changes such as eating a diet low in saturated fat and exercising can help you go a long way toward reaching that goal. If they’re not enough, there are effective medications to help you. I’ll spend the later chapters of the book discussing lifestyle-
and medication-based cholesterol control plans and teaching you how to stick with them (the hard part, for some).

This book will also explain everything you need to know about cholesterol on the cellular level, the process for testing your cholesterol and evaluating your results, and how high cholesterol causes problems in the body. In this day and age, no book on cholesterol would be complete without a discussion of holistic approaches, so I spend time dissecting the evidence on the complementary and alternative therapies touted for lowering cholesterol. I also offer advice for specific groups of people, including older adults, people with heart disease, people with diabetes, and children.

All this information comes backed by the latest scientific studies—but simplified so reading and comprehending it isn’t a chore. While the science that has led to our understanding of the relationship between cholesterol and heart disease is sometimes complex and technical, the basic concepts underlying the treatment of cholesterol disorders are straightforward and easily understood. I try to avoid using medical jargon when talking to patients in my office, and I avoid doing that in this book.

I will also try to make clear the distinction between what we know with great certainty and what we believe but need more research to confirm. Unfortunately, a lot of medical information is presented to the public as being definitive, when it is anything but, and this leads to a great deal of skepticism when that information is later retracted or contradicted by other studies. After reading this book, you should have better insights into what kinds of medical studies are likely to stand the test of time and which ones are too premature to act on now.

It is important to have a working knowledge of these topics if you are interested in leading a long and healthy life. After all, high cholesterol affects about 18 percent of Americans ages twenty to seventy-four, and atherosclerotic heart disease is the single leading cause of death and disability in the developed world. I am one of the many people who fall into this 18 percent: I saw my cholesterol levels rise in the early 1990s and tried several cholesterol-lowering drugs until I found the one that worked for me. Now, I have my cholesterol under control, but I do battle with a fondness for the same high-fat foods that my patients struggle to cut from their diets. I try to practice what I preach to my patients and recommend in this book, though. I eat a healthy diet and stay active swimming; playing basketball, tennis, and golf; and trying to keep up with my two teenagers, James and Sarah. (I can’t, however, keep up with my wife, Sherry Haydock, who is also a doctor and has completed twenty-four marathons.)

My interest in cholesterol emerged much before my own levels rose, and I have my mother to thank for it. In the 1950s, she read about cholesterol and decided to cut butter out of our diet and give me and my siblings only skim milk from then on. She was way ahead of the times on that one, though I distinctly remember not welcoming those changes with much enthusiasm.

I first studied lipoproteins as a medical student at the University of California–San Francisco Medical School and became convinced that cholesterol treatment was critical to the prevention of coronary artery disease. I’ve devoted my career to it ever since, opening the Lipid Clinic at Massachusetts General Hospital in 1986, where patients with lipid disorders still come from around the world to see me each week. In addition to seeing patients, I direct a research laboratory that has played a key role in identifying and studying proteins that help us understand cholesterol’s role in
heart disease. This clinical and research work provides the foundation for my thinking about cholesterol disorders. It also provides the knowledge that I try to impart to the young doctors in training at Harvard Medical School, as well as the hundreds of visiting physicians who come to train at Massachusetts General Hospital every year. That experience also forms the basis for this book.

If my years of working with cholesterol have taught me one thing, it’s that the link between cholesterol and the risk of heart disease is not a medical fad that’s going to disappear from the health-care scene anytime soon. The good news is there’s a lot you can do to lower your cholesterol, and every time you lower your LDL cholesterol, your heart disease risk drops substantially. I hope this book will provide the encouragement you need to get your cholesterol under control and keep it there.
As with any project of this size, there are many people who worked tirelessly behind the scenes to get this book printed. At Harvard Health Publications, I thank Dr. Tony Komaroff, editor-in-chief, for providing me with the opportunity to publish this book, and for seeing me through the process. Managing Editor Nancy Ferrari edited and provided guidance along the way, and interns Gareth Hughes, Jonah Leshin, and Vered Schreiber helped in innumerable ways. Pat Skerrett and Dr. Thomas Lee, editors of the *Harvard Heart Letter*, also lent much help. Production team Heather Foley, Mary Allen, and Charlene Tiedemann shepherded me through the illustration process, and the illustrations of Michael Linkinhoker and Ed Wiederer beautifully accompany the text. Drs. John G. Byrne, chairman of the Department of Cardiac Surgery at Vanderbilt University, and Donald B. Levy, an instructor of medicine at Harvard Medical School and primary care physician at the Marino Center, lent their expertise to the surgery and alternative medicine sections of the text, respectively. Dr. Kenneth L. Minaker, chief of the geriatric medicine unit at Massachusetts General Hospital and associate professor of medicine at Harvard Medical School, added valuable information to the section on caring for elderly patients.

I would like to thank my coauthor, Christine Junge, who did all the hard work that went into writing the book. Her organizational skills, research diligence, lucid writing, and keen intelligence are evident throughout. What isn’t evident is her extraordinary patience and good humor in dealing with a novice author who routinely missed deadlines. Whatever merits a reader finds in the book can be directly attributed to Christine, while the faults can be laid clearly at my feet.

I would also like to acknowledge a number of important relationships that, while not directly tied to the production of the book, were nevertheless fundamental to the experiences needed to write it. My mother first got me interested in cholesterol and its connection to heart disease without making me paranoid about food. My first scientific mentor, Dr. Albert L. Jones, let me into his laboratory my first summer in medical school at the University of California—San Francisco, and, despite my propensity for breaking his most expensive pieces of laboratory equipment, shared his passion for lipids and research. Drs. John T. Potts, former chief of medicine at the Massachusetts General Hospital, and Henry Kronenberg, chief of the endocrine division at MGH, provided the intellectual training and financial support that enabled me to pursue a research career in the molecular biology of lipid disorders, and then enabled me to establish the Lipid Clinic and Lipid Metabolism Unit at the MGH. Christie Kuo, R.N., played a vital role in setting up the Lipid Clinic when it first opened, and then cared for every patient with extraordinary skill and compassion. Carol Whooley and Jennifer Bagan have provided the organizational skills in the Lipid Metabolism Unit that have allowed it to operate effectively while I stole the time to work on this book. Scores of medical students, residents, and clinical and research fellows have spent time in the Lipid Metabolism Unit studying the connection between cholesterol and heart disease, and providing outstanding care to the patients they encountered. And, several thousand patients with whom I have had the pleasure of working in the Lipid Clinic for nearly two decades taught me all that I know about lipid disorders.

Finally, at home, my children, James and Sarah, have helped by voicing few complaints when hospital work or writing commitments drew their father’s attention away from their activities. And
my wife, Dr. Sherry Haydock, who has worked with me in the clinic ever since we started it in 1986, continues to make my life, both at work and at home, a joy.

—Mason W. Freeman, M.D.
High cholesterol is a serious health problem that affects about fifty million Americans. It’s a major risk factor for cardiovascular disease (CVD), which half of all men and a third of all women will get at some time in their lives. I’ll spend the majority of this book on the two things my patients ask about most: how cholesterol and heart disease are connected and what they can do to optimize their cholesterol levels. But I want to take a few pages early on to clarify that cholesterol in and of itself isn’t bad. While too much cholesterol can be harmful, just the right amount of it does a lot of important work in the body. But like carbohydrates in recent years, cholesterol has gotten such a bad rap that most people don’t know the good it does.

Cholesterol performs three main functions:
1. It helps make the outer coating of cells.
2. It makes up the bile acids that work to digest food in the intestine.
3. It allows the body to make Vitamin D and hormones, like estrogen in women and testosterone in men.

Without cholesterol, none of these functions would take place, and without these functions, human beings wouldn’t exist.

What Is Cholesterol?
Cholesterol is a fat, or lipid. It is also a sterol, from which steroid hormones are made. If you held cholesterol in your hand, you would see a waxy substance that resembles the very fine scrapings of a whitish-yellow candle. Cholesterol flows through your body via your bloodstream, but this is not a simple process. Because lipids are oil-based and blood is water-based, they don’t mix. If cholesterol were simply dumped into your bloodstream, it would congeal into unusable globs. To get around this problem, the body packages cholesterol and other fats into minuscule protein-covered particles called lipoproteins (lipid + protein) that do mix easily with blood. The proteins used are known as apolipoproteins.

The fat in these particles is made up of cholesterol and triglycerides and a third material I won’t discuss much, phospholipid, which helps make the whole particle stick together. Triglycerides are a particular type of fat that have three fatty acids attached to an alcohol called glycerol—hence the name. They compose about 90 percent of the fat in the food you eat. The body needs triglycerides for energy, but as with cholesterol, too much is bad for the arteries and the heart.

A Lipoprotein by Any Other Name
The two main types of lipoproteins important in a discussion on heart disease are low-density
lipoproteins (LDL) and high-density lipoproteins (HDL). Though the names sound the same, these two particles are as different as night and day. The differences stem from their densities, which are a reflection of the ratio of protein to lipid; particles with more fat and less protein have a lower density than their high-protein, low-fat counterparts. There are countless other lipoproteins, some of which I’ll discuss in later chapters, but in order to get a basic understanding of how cholesterol affects your body and how the food you eat affects your cholesterol levels, LDL and HDL are the ones to start with.

What Are the Different Types of Fats?

Most people are vaguely familiar with the terms saturated and unsaturated fat. But what do they really mean? All fats have a similar chemical structure: a chain of carbon atoms bonded to hydrogen atoms. What differs is the length and shape of their carbon atoms and the number of hydrogen atoms. These slight structural differences create crucial differences in how the body reacts to them. I’ll go into more detail about diet and cholesterol in Chapter 6, but for now, here’s a primer:

• Saturated fat. The word *saturated* here refers to the number of hydrogen atoms these fats have. The chain of carbon atoms that makes up these fats holds as many hydrogen atoms as possible, so they’re saturated. Saturated fats are unhealthy.

• Unsaturated fat. These have fewer hydrogen atoms and are healthy for you. There are two different kinds of unsaturated fats: polyunsaturated and monounsaturated. Polyunsaturated fats, like omega-3 fats and omega-6 fats, have four or more carbons that are not